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ABSTRACT

This long-term Records and Archives Administration Programme (RAMP) study is designed to assist archivists, records managers, and information specialists in identifying for current use and possible archival selection those transactional or case files that contain scientific and technical information (STI), particularly in those instances where that information is not the main subject of the file. The study is confined to manual records systems, chiefly of a registry type, and should be most useful in developing countries that still employ such recordkeeping systems. Topics covered include: the importance of STI for development; responsibilities of government in identifying government agencies producing STI and the transfer of such information to an agency or agencies dealing with STI; identification of primary and secondary STI records in government offices; methodology to retrieve and disseminate STI in current files or records; access to STI in current files; access to STI in records deposited in record centers; appraisal and disposal of STI files deposited in record centers; transfer of STI records to the national archives; arrangement and description of STI files records in archives; a content indexing system for retrieval of STI in archives; and access to STI records in archives. Sample engineering and chemical vocabularies developed for content indexing, a 91-item select bibliography, and a 33-item bibliography of RAMP and related documents are included. (THC)

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Paris, 1984

SCIENTIFIC AND TECHNOLOGICAL INFORMATION IN TRANSACTIONAL FILES IN GOVERNMENT RECORDS AND ARCHIVES: A RAMP STUDY

prepared by

K.D.G.WIMALARATNE

General Information Programme and UNISIST

United Nations Educational, Scientific and Cultural Organization.

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PREFACE

The Division of the General Information Programme of Unesco, to help meet the needs of Member States, particularly developing countries, in the specilaized areas of records management and archives administration, has developed a long-term Records and Archives Management Programme - RAMP.

The basic elements of the RAMP programme reflect the overall themes of the General Information Programme. RAMP thus includes projects, studies, and other activities intended to:

(1) Promote the formulation of information policies and plans (national, regional and international).

(2) Promote and disseminate methods, norms and standards for information handling.

(3) Contribute to the development of information infrastructures.

(4) Contribute to the development of specialized information systems in the fields of education, culture and communication, and the natural and social sciences.

(5) Promote the training and education of specialists in and users of information.

The present study, prepared under contract with the International Council on Archives--ICA--is intended to assist archivists, records managers and then information specialists, particularly in developing countries, in identifying for current use and possible archival selection those transactional or case files that contain scientific and technological information, particularly in those instances where that information is not the main subject of the file. The study is confined to manual records systems, chiefly of a registry type, and should be most useful in those developing countries that still employ such record-keeping systems.

Comments and suggestions regarding the study are welcomed and should be addressed to the Division of the General Information Programme, UNESCO, 7 place de Fontenoy, 75700 Paris. Other studies prepared under the RAMP programme, a list of which is appended to this study, may also be obtained from the same address.

TABLE OF CONTENTS

		Page
Chapter 1	Introduction	1
Chapter 2	The importance of STI for development	4
Chapter 3	Infrastructure for the retrieval and disseminiation of STI	4
Chapter 4	Responsibilities of Government in identifying Government agencies producing STI and transfer of such information to an agency or agencies dealing with STI	7
Chapter 5	Action programme for Government agencies to highlight STI filles in public institutions	8
Chapter 6	Identification of Primary and Secondary STI records in Government Offices	12
Chapter 7	Methodology to retrieve and disseminate STI in Current Files or Records	14 14
Chapter 8	Access to STI in Current Files	20
Chapter 9	Retrieval and Dissemination of information of STI in records transferred to a Record Room of Record Centre (Limbo)/ Pre-Archivage	22
Chapter 10	Access to STI in records deposited in Record Centres	25
Chapter 11	Appraisal and disposal of STI files deposited in Record Centres	26
Chapter 12	Transfer of STI records to the National Archives	30
Chapter 13	Arrangement and Description of STI files records in Archives	32
Chapter 14	Effectiveness and efficiency of provenence method for description and retrieval of STI in Archives	35
Chapter 15	A content indexing system for retrieval of STI in Archives	36
Chapter 16	Access to STI records in Archives	39
Appendix	Some sample Vocabularies in Science and Technology developed for content indexing	
	1.1 Engineering Vocabulary	40
	1.2 Chemical Vocabulary	41
Select Bibliography		42

List of Figures

Fig. 1	The relations between the branches of natural science and technology	3
Fig. 2	Management and flow of STI in government agencies	6

List of Figures

		Page
Fig: 3	Preliminary inventory of STI current files in government offices.....	10
Fig: 4	STI sources, channels of information transfer and retrieval...	15
Fig: 5	Schedule of current records/files in public Offices containing STI.....	18
Fig: 6	Retrieval of STI in machine--readable records.....	20
Fig: 7	Transmittal schedule for transfer of semi-current and non-current STI records to an intermediate storage/records Centres/ Limbo.....	23
Fig: 8	Sample-File/Folder/cover indicating the symbols and code references to STI.....	24
Fig: 9	Transfer schedule of records transferred to the National Archives for permanent preservation.....	30
Fig: 10	Transfer schedule of Machine--readable records to be transferred to the Archives.....	32
Fig: 11	Specimen Index card for content indexing.....	37
Fig: 12	Arrangement of Head and Sub-Head Cards.....	37
Fig: 13	Arrangement of content index cards using guide Head and Sub-Head Cards.....	38

SCIENTIFIC AND TECHNOLOGICAL INFORMATION IN TRANSACTIONAL FILES IN GOVERNMENT RECORDS AND ARCHIVES: A RAMP STUDY

1. INTRODUCTION

1.1 Because of the frequency of their use in this study, it is essential to, indicate meanings assigned to the terms 'scientific', 'technology', 'information', 'STI', 'transactional files', 'records', 'archives', 'current records', 'semi-current records', 'non-current records', and 'STI records'.

1.2 Scientific: In this study scientific is used to mean pertaining to research activities in the field of Natural Science, which includes physical and biological sciences. The research may be basic or applied; it may be exploratory, observational or experimental.

1.3 Technology: As used, this term is invariably scientific, and encompassess engineering, managerial and other knowledge necessary to produce the goods and services needed by society.

1.4 Information: This refers to the content or message of a written or oral communication or discourse.

1.5 STI: Accordingly, 'Scientific and Technological information'--STI-- is thus interdependent and cannot be rigidly separated. As the concept is interdependent, fragmentation into a host of unconnected specialities, with each speciality continuing to narrow, weakens technology as an instrument of applying knowledge. Modern STI needs to be more and more interconnecting. (See Fig.1).

1.6 Transactional files: Records are created in public offices as a result of the day to day transactions that take place within the organisation or with outside institutions. When transactions take place in an office, documents or records pertaining to a subject or related subjects are maintained, preserved or filed in folders, docket or files. These transactional files may be either policy files, where papers or documents related or connected with a policy matters are filed together, or 'case files' created as a result of a transaction or correspondence with relation to a particular case. These case files may reflect the working of a policy or policies of the institution.

1.7 Records: As used herein, records refers to all recorded information, regardless of media or characteristics, made or received and maintained by an institution in pursuance of its legal obligations or in the transaction of its business. Accordingly, records may include all written material, handwritten, typed or printed drawn or engraved, all sound or voice recordings, photographic prints, or negatives. Also included are all still cinematographes, all data processed material whether punched, printed or coded on cards, tapes or magnetic discs.

1.8 Current records: This term is used to refer to those records needed to conduct the current business of the institution or agency. They should be immediately accessible and maintained in prime office space and appropriate filing equipment.

1.9 Semi-current records: This term refers to those records no longer needed in office space to conduct current business and which should be retained in Intermediate/Limbo, inexpensive storage.

1.10 Non-current records: Those records no longer needed by the agency or institution in conducting current business are referred to as non-current records. Those non-current records where action is complete are closed for transactions and should be disposed of after appraisal.

1.11 Archives: The non-current records of an organization or an institution preserved because of their continuing value are referred to as archives.

1.12 STI records: For convenience, records, files and archives containing STI are collectively referred to in this study as STI records.

FIGURE 1

A CHART ILLUSTRATING SOME OF
THE RELATIONS BETWEEN THE BRANCHES OF NATURAL SCIENCE AND TECHNOLOGY
H.J.T. Ellingham. 1948.

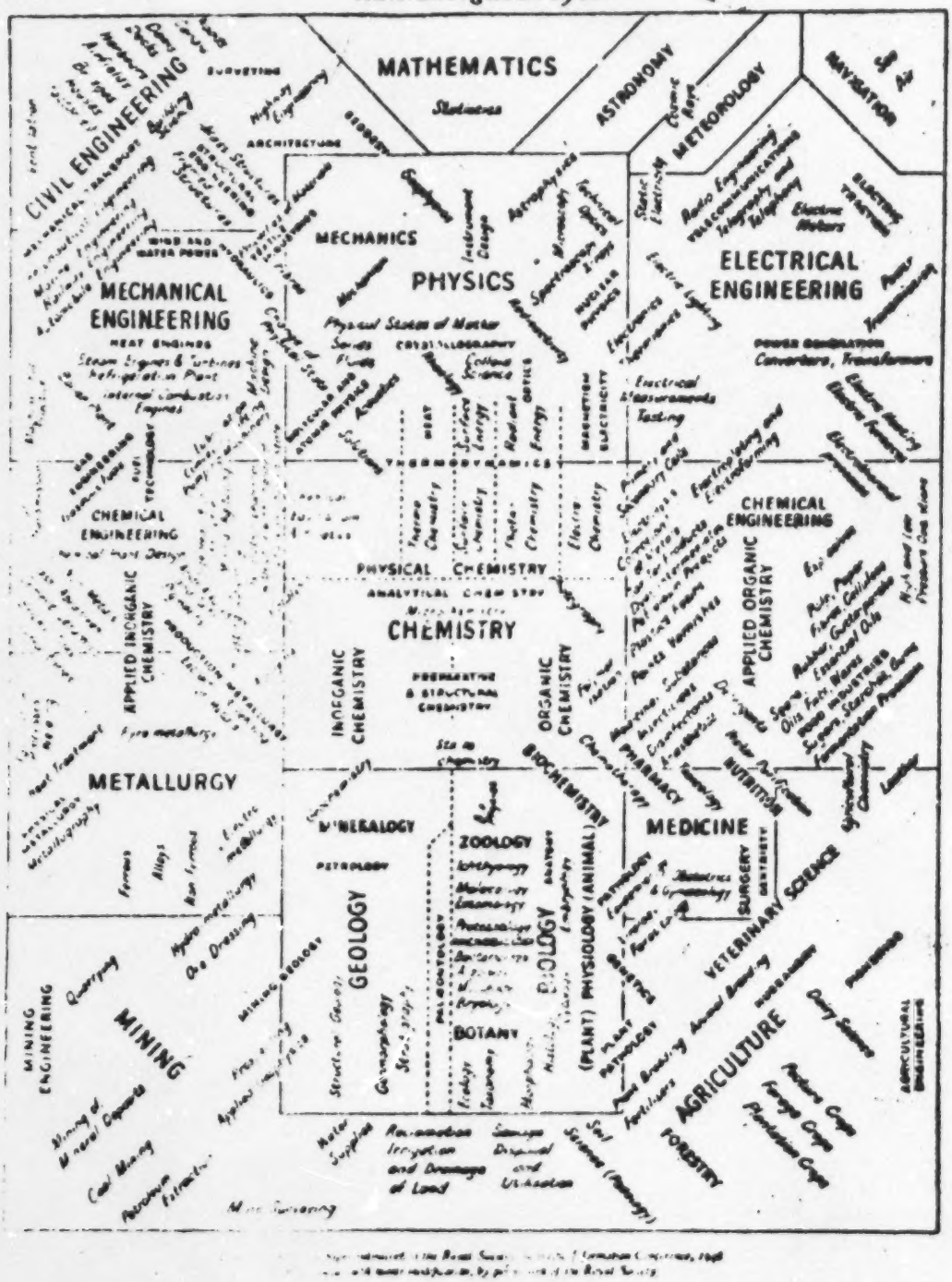

Fig. 1—A chart illustrating some of the relations between the branches of natural science and technology—H. J. T. Ellingham, 1948.

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2. THE IMPORTANCE OF STI FOR DEVELOPMENT

2.1. It is well accepted that the modern age belongs to science and technology. Hence, STI plays a major and vital role in achieving social, cultural, political and economic goals of every country. There is no doubt that STI has an impact on virtually every facet of our daily lives, including our work. leisure. transportation, communication and general welfare. Scientific information embodies not only the heritage of man's verified knowledge, but also the current records of his never-ceasing inquiries into truth. It constitutes an essential resource for the work of scientists. It is also a medium for the education of future scientists and principal reservoir of concepts and data to be drawn on for application to economic and technological development programmes. Accordingly, judicious utilization of STI as a national resource is the key to progress in technically advanced or advancing societies. A country without an indigenous scientific and technological capacity has no means of being aware of its own needs nor of the opportunities existing in science and technology elsewhere. It is important to remember that STI is a key factor in all endogenous development and in every country's capacity for innovation, as it encourages scientific and technological research. Accordingly, expeditious retrieval of scientific and technical information is considered vital for the intellectual and material development of a country. The users of scientific and technical research findings will definitely stimulate a demand for scientific research among productive sectors of the economy in a country. If the retrieval system functions poorly, scientific and technical knowledge will remain compartmentalized and undiscovered as a resource for the National welfare.

2.2. In the modern world STI is of capital importance for all countries. It is crucial to the growth and enrichment of all the sciences. Today STI is recognised as essential to social progress and to the understanding of the problems affecting the lives of nations. The lack of STI is a very serious obstable to development, as society must learn to gain control of scientific and technical knowledge and to make full use of it in order to progress. President John F. Kennedy once remarked that strong science and technology is a national necessity and adequate communication is a prerequisite for strong science and technology.

3. INFRASTRUCTURE FOR THE RETRIEVAL AND DISSEMINATION OF STI

3.1 As administrative structures and organizational frameworks differ from one country to another, there is neither a standard pattern of planning and implementing STI policy, nor ideal or model services and institutes which are needed in each country. Accordingly, institutional and legal infrastructures necessary for the retrieval and dissemination of STI cannot be standardized, but generalizations are possible.

3.2 The organizational and other structural frameworks for national information systems for STI have been discussed in many documents issued by Unesco and in country studies carried out by individual countries[1]. However, these studies emphasize infrastructures necessary for the retrieval and dissemination of secondary, published or printed source material on STI created by the mission-oriented public institutions or purpose-oriented private bodies. The institutional and statutory infrastructures recommended in the retrieval and dissemination of secondary STI source material have been the popular library, information or documentation centre system which is linked to a national referral centre, clearing house, or central agency responsible for the overall STI network.

1. Using and Improving National Information systems for development, some practical implications for Policy makers. (draft), UNESCO, SC/74/WS/53, October 1974; Guidelines on the Planning of National STI systems, Unesco, SC/74/WS/39, July 1975; Scientific and Technical Information in Canada (1969), pp. 168.

3.3 Nevertheless, the present study, which is concerned with a methodology to retrieve and disseminate STI in transactional or project files created in public offices, is primarily concerned with STI sources which are primary and unpublished, i.e., manuscript, typewritten or recorded in any other manner. Accordingly, the institutional and legal infrastructure has to be modified and adapted to accommodate STI in records or files.

3.4 When recommending an infrastructure suitable for the retrieval and dissemination of primary STI sources in files or records, it is convenient and advisable to accept the institutional and legal infrastructure necessary for the working of the records and archives administration services. In this framework, the library, documentation or information centre system could be accommodated for the expeditious and systematic retrieval and dissemination of STI.

3.5 The basic institutional and administrative infrastructure for primary STI in records or files is shown in Figure 2.

3.6 Figure 2 indicates, that retrieval and dissemination of STI in project files depends on the record administration concepts based on rules and regulations controlling the full life-cycle of the records, i.e. from the stage of their creation, (the current stage), to retirement to record rooms or record centres when records are semi-current or non-current, to their appraisal for disposal, transfer to a National Atchival agency of those records selected for preservation.

3.7 In this process of administration of records or files in their various stages as described above, unrestricted or unclassified STI in these files could be retrieved and disseminated to special libraries, dealing with science and technology, documentation centres or information centres, and these centres could, in turn, disseminate STI to the National or central services centre in order to repackage information to the needs of the scientists and technologists. Meanwhile, the government departmental libraries dealing with scientific and technological information or information centres could use the unclassified STI for the benefit of the users.

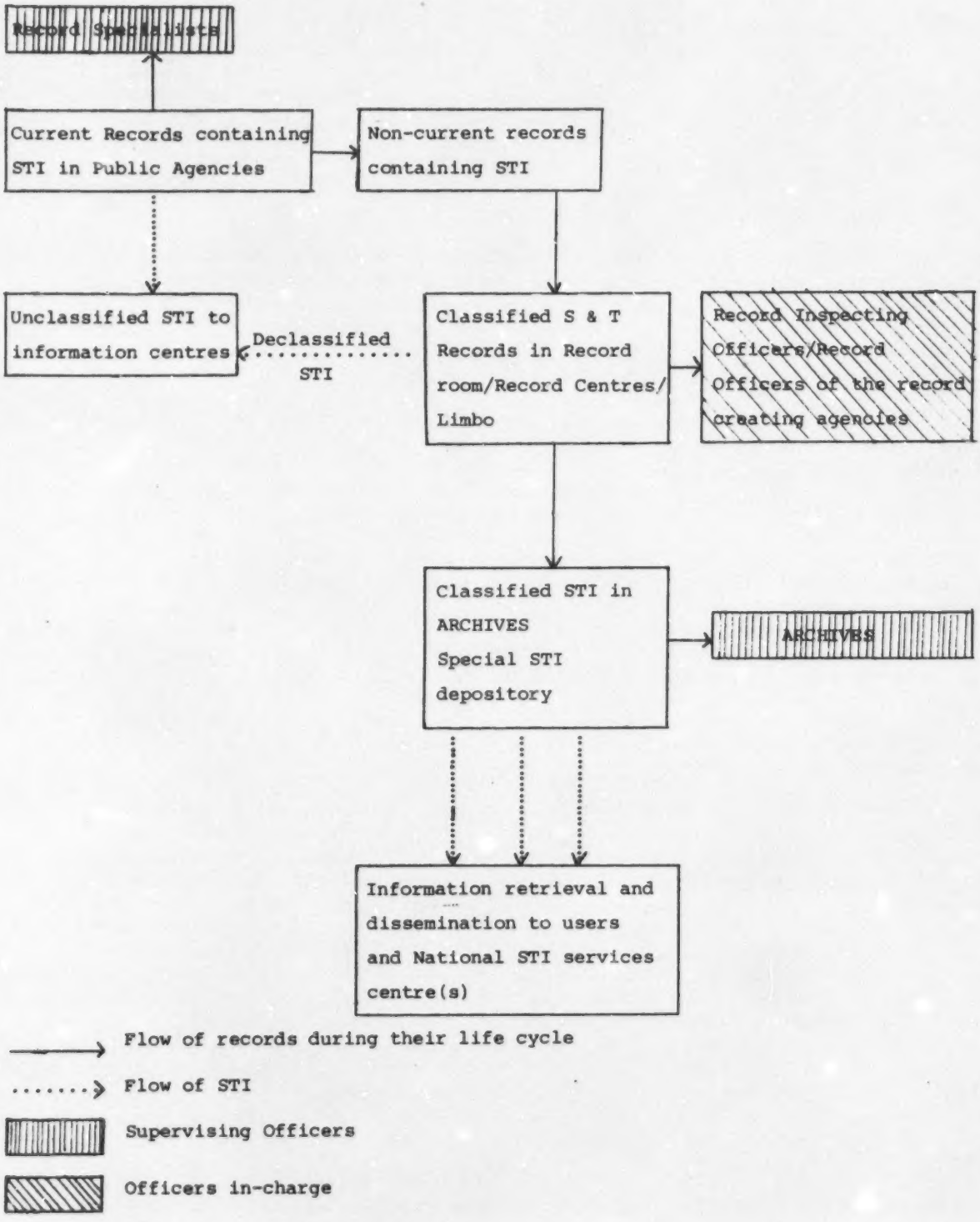
3.8 However, restricted or classified STI would flow its normal course as shown in Figure 2, either to government record rooms or low cost record centres (limbo repositories) and finally will flow into the National Archives for permanent preservation. As in the German Democratic Republic, special repositories could be established for the permanent storage of 'STI archives'. This special repository system could employ specially trained staff oriented in science and technology and also create a specialized information system.

3.9 The staff responsible for the working of the proposed infrastructure is indicated in Figure 2. Record specialists would be in charge of current records and advise on retrieval of STI in these records when they become semi-current: Record Inspecting Officers, Record Keepers and Record Managers would advice on the storage and retrieval of STI at the record room stage. The Record Centre or Intermediate storage of semi-current, non-current and closed records would be supervised by officers from the record-creating agencies and from the National Archives. Lastly, the Archivists in the National Archives would store and retrieve STI in records deposited for permanent preservation. In addition to these officials who will be in charge of records administration the government special scientific and technical librarians, documentalists and information scientists would work in liaison with the personnel indicated above to repackage primary, raw, published or duplicated STI flowed into their information centres. These centres would be linked directly with the National STI service centre, which would be the store house and disseminating agency for all STI generated in government offices.

3.10 The personnel involved in retrieving and disseminating STI should be professionally trained. Otherwise, delay in the flow of STI and its dissemination would adversely affect it being used effectively and expeditiously as a national resources for development.

FIGURE 2

MANAGEMENT AND FLOW OF STI IN GOVERNMENT AGENCIES


Record Specialists
Current Records containing STI in Public Agencies
Non-current records containing STI
Unclassified STI to information centres
Declassified STI
Classified S & T Records in Record room/Record Centres/ Limbo
Record Inspecting Officers/Record Officers of the record creating agencies
Classified STI in ARCHIVES Special STI depository
ARCHIVES
Information retrieval and dissemination to users and National STI services centre(s)
Flow of records during their life cycle
Flow of STI
Supervising Officers
Officers in-charge

3.11 If the model infrastructures discussed above does not exist in a particular country, it is advisable to set up at least the basic institutional and personnel structure in order to operate a basic STI retrieval and disseminating system. This basic structure would include the administration of current-files in the creating agencies, the identification and retrieval of non-current records containing STI in the creating agencies, and the transferring of these records to a National Archives for permanent preservation. This would mean that the National STI centre, if one is in existence, could obtain STI through computer data process or citations or hand lists from files when they are deposited in the respective departmental record rooms or in the National Archives. Although this is a possible alternative, it would delay packaging and re-packing STI, and the information work always be out-date and irrelevant.

4. RESPONSIBILITIES OF GOVERNMENT IN IDENTIFYING GOVERNMENT AGENCIES PRODUCING STI AND TRANSFER OF SUCH INFORMATION TO AGENCY OR AGENCIES DEALING WITH STI.

4.1 Governments tend to play an important and increasing part in the planning of STI activities as it is considered a national resource whose exploitation is a national responsibility. Moreover, the percentage of national budgets spent by governments for mission or purpose-oriented scientific and technological research provides added responsibility for governments in planning and putting into good use for the benefit of the community the tax payers money spent on research involving science and technology.

4.2 The goal and responsibility of any government is to administer the state efficiently for the benefit of the community, records and archives management service can and should play an important part in achieving these objectives. As the employees of the government are the greatest creators of records as a result of their wide activities, its records should be managed to retrieve necessary information as and when needed by the state. Accordingly, every state has a responsibility to evovle a system, through infrastructure development and regulations, to highlight, identify, retrieve, disseminate and provide quick access to records of importance to the socio-economic development of the country. In this context S and T records prove to be among the most important records created by a state.

4.3 However much importance should be attached to the millions of STI records generated by the government, the fact remains that many states have developed their institutional and legal infrastructures to carry out traditional records management programmes without giving due emphasis to highlight STI records in government agencies.

4.4 The basis of any records management programme is a survey of current and semi-current records created by the public institutions for appraisal and later disposal. It is essential that regulations and guidelines should be formulated by the central or federal government agency at the stage the survey of current and semi-current records commences. In government records management programmes currently operating throughout the world there is no special emphasize on the part of National governments to identify and retrieve STI in the preliminary records surveys.[1] However, a number of countries, including the United Kingdom[2] Czechoslovakia[3] and Denmark[4] and Singapore have legislated to preserve at whatever cost papers relating to the more important aspects of science and technology research and development. It is interesting to note that in a list of appraisal criteria containing 13 items STI records are given the twelth place[5]. This clearly indicates the need for governments to change

1. A guide for Departmental Record Officers, (3rd Edition). 1971, pp. 25, Public Record Office.
2. Archivum, Vol. XXVIII, pp. 118
3. Ibid, pp.127
4. Guidelines for the Selection & Disposition of Public Records, Singapore, n.d.), pp.6
5. Public Record Office, OP cit, pp. 24-25.

their pattern or systems of records surveys in order to retrieve STI as a national resource. A careful look at records and archives management legislation reveals that while the majority of governments have taken great care to define terms such as 'Historical Records', 'Judicial Records', 'Public Records', there is no attempt to define or interpret the term 'Scientific and Technical records' in their respective legislation. However, a committee in Great Britain appointed recently to look into the problems of modern records has observed that special attention is necessary for the review of Scientific, Technical and other record material in public institutions.

4.5 To help solve this problem of the identification and transfer of STI, existing records and archives management rules and regulations should be amended or new legislation included in records and archive management programmes.

4.6 Government as the responsible body for the improvement and utilization of STI should direct the National Archival agency to frame legislation within the framework of records and archives management services to make it obligatory for public institutions to identify STI in their custody.

4.7 This objective could be achieved in two ways. Firstly, heads of public offices could be made responsible for bringing to light any STI records in their custory. Secondly, when the STI is retrieved from the current or semi-current files of an institution, it should be channelled to the Departmental library dealing with science and technology, local information centre, or the National Information centre. If STI records are treated only like other records created by public agencies, where slow procedures and retrieval techniques are generally followed under the normal records and archives administration programmes, the value and importance of STI for National development will be lost.

4.8 Under the existing records management rules and regulations all over the world, public records are systematically reviewed for appraisal several years after the closure of the files or when the files become semi-current or non-current.

4.9 This would mean record survey programmes will begin to unearth the files in a public office long after the current usefulness of the files are exhausted and the informational content in the files are almost forgotten by its creators. Although this is not generally a critical problem in respect to project files containing socio-economic information, it is a vital matter for STI records owing to the practical importance of STI.

4.10 Accordingly, government responsibility lies in the direction of regulating and directing public offices to identify and retrieve STI, considering them as special records or information to be documented for early dissemination.

4.11 Legislation in this area will be a problem for countries where National Archives have no legal responsibility for the administration of current records. However, governments could compromise between the records-creating agencies and the national archival agency with appropriate legislation in order to identify and disseminate scientific and technological information in their countries. The purpose of legislation in this direction will be to educate the creators of public records on the importance of STI records in their possession, and the advantages and the national importance of its early utilization.

5. ACTION PROGRAMME FOR GOVERNMENT AGENCIES TO HIGHLIGHT STI FILES IN PUBLIC INSTITUTIONS.

5.1 The primary objective of the action programme is to create a preliminary inventory of the project or case files created in public offices which may contain

STI. This files inventory could be made use of and developed into a record schedule in order to highlight STI documents or papers filed in project files.

5.2 Two considerations are of utmost importance in the development of a systematic action programme for the efficient retrieval of STI files intermixed with other records of a public institution:

1. Government responsibility in placing the responsibility for the action programme with a central agency.

2. Providing a legal and administrative basis for the action programme, and issuing government regulations in order to implement the STI records survey in all public offices.

5.3 Experience has shown that responsibility of overall direction of a records management programme in which STI records would be retrieved is best placed with the National Archival agency. In countries where the National Archives has little or no control over records creation and current records maintenance, it is essential that appropriate legislation be enacted to provide such control. Accordingly, the authority vested in the National Archival agency would enable the operation of a systematic and planned action programme within the framework of the records management programme, avoiding any additional work load for the staff engaged in identifying files of records for disposition.

5.4 To implement the action programme in public institutions, rules and regulations should be issued by the National Archival Agency to the head of every public office regarding the records management programme. This would enable the National Archival agency to co-ordinate the records management and identification procedure with a responsible officer of each public institution. This officer may be a records officer or a records manager who should have a knowledge of the organization and functions of the agency and the various types of records created in its various administrative unit.

5.5 In the task of identifying STI records in public offices, the National science authority could help the National Archival Agency by providing the expertise needed to define STI records and in arranging for early access if agreed to by the creating agency.

5.6 In carrying out an action programme for the identification of STI records, the National Archives officials should work in collaboration with the officers of the creating agencies. Accordingly, the first step in the action programme would be to make an inventory through a survey of STI records created in each public institution.

5.7 The STI records inventory would not be a document-by-document or folder-by-folder listing of STI files. It would be a preliminary list of each type of record or series, together with an indication of where they are located. The inventory would include all current project files arranged in series or sub-series containing STI and maintained in the agency, as well as the semi-current STI records in storage within the creating office.

5.8 A sample inventory form that could be used in the action programme is shown in Figure 3.

5.9 Terms appearing in the inventory form (Fig. 3) are used in the following sense.

5.10 Series: A series consists of file units or documents arranged in accordance with a filing system, or maintained as a unit because they relate to a particular

FIGURE 3

Preliminary inventory of STI current files
in Government Offices.

Name of creating institutions/office: (e.g. Ministry of Industries)

Name of creating branch/division: (e.g. Development branch)

Name of officer responsible for the preparation of inventory: (e.g. Record Officer)

Date of completion of the inventory: (e.g. 10 October 1982)

Date inventory sent to National Archives: (e.g. 10 December 1982)

Address of the institution: (e.g. P.O. Box 1510. Colombo 2)

Telephone Number:

I hereby certify that the contents herein are correct.

.....

Signature of Head of the Institution.

Date:.....

Serial No.	Description of Transaction files/ records series/sub-series.		Inclusive years in series/sub-series	Location of records
1	(e.g.)Aid to develop salt industry (series)	*Eng	(e.g. 1970 - 1979)	(e.g.) Building No.01 Room, 10 Rack, 05
2	(e.g.) Manaufacture of Gypsum (Sub-series)	*Eng	(e.g. 1970 - 1975)	Drawer 06/ Almirah 09
3	Correspondence (Varia)	*Eng	(e.g. 1975 - 1976)	Room 19

* ISO Language symbols could also be used to denote languages.

function, result from the same type of activity, have a particular physical form, or because of some other relationship arising out of their creation, receipt of use.

5.11 Sub-series: A sub-series consists of files or records arranged in accordance with a filing system or they are related to a particular function connected with the main series and occurring within a series as described above.

5.12 The full and accurate description of the series or sub-series title is essential; poor descriptions may mislead a person analysing the entries in the inventories for retrieval of STI in file units found among series and sub-series.

5.13 In this context merely using general terms such as 'correspondence'--'Inward' --'Outward', does not suffice. If the series or sub-series is 'correspondence'; the subject matter of the correspondence should be indicated.

5.14 Terms such as 'general' 'miscellaneous' and 'varia'; which add nothing to the description and provide no precise information useful for purpose of expeditious retrieval of STI, should be avoided. In some situations there may be valuable and relevant STI in record series or sub-series described using such general terms. Use of such terms may be the result of unplanned, unsupervised records creation in public offices or employment of untrained personnel in records creation work. Care should be taken to examine the records in series titled 'general' 'miscellaneous' or 'varia' to determine whether any relevant or important STI is found filed therein. In such a situation the officer preparing or supervising the inventory could indicate under the relevant serial number on the inventory, a symbol of caution to those analysing the inventory.

5.15 The symbol used should be clearly defined and would serve as a guide that although the record series contains varia, there are relevant and important STI to be retrieved from within the series.

5.16 When the inventories have been received by the National Archival agency, that agency should immediately communicate with the central agency for STI and should undertake the analysis of the data contained in the inventories.

5.17 During this analysis the public institutions that hold current STI files could be identified as early as possible and necessary steps should be taken to facilitate retrieval of relevant information.

5.18 When following up action on the inventoring, locating and retrieving of STI, the personnel of the National Archives should be assisted by the Central agency for STI and the liaison officers or records managers (officers) of the creating agencies. The co-operate effort of the record creating agency, National Archives and Central agency for STI would arouse a national awareness of the existence of STI records in government institutions. It would also help create a sense of responsibility among the records creators or administrators, encouraging them to take precautions against the unauthorized destruction and for the preservation of important records which are frequently the victims of lack of storage, movement of offices, expansion of buildings, or sudden administrative decisions.

5.19 Once inventories are completed and the contents of records therein are known by agencies other than the creating or accumulating agency, the inventory could be used as a tool to remind the creator of the importance of records and their legal preservation.

5.20 With the completion of the 'action' programme to identify the public institutions creating and holding STI records, the central STI centre should publish, for the information of scientists, technologists, and other categories of users interested

in STI, a hand book containing basic information on the STI holding agencies. If there is a network of libraries or information centres attached to every public office, each centre could publish its own STI hand book. This hand book could cover the following detains:

1. Name of the public institution.
2. Head of the Institution.
3. Name of Records manager or officer.
4. Address.
5. Telephone Number.
6. Branches or divisions holding STI records, basic STI record series and sub-series with inclusive dates.
7. Language(s).
8. Classified (restricted access) or open.
9. Location of records.
10. Authority for access to be obtained from.

5.21 A survey to prepare an inventory of all current records containing STI frequently reveals other physical types of documentation, viz; cassettes, discs, reels or magnetic tape, slides, photographs, cine films, maps, charts, microforms, etc. recording STI. Public offices may make use of these modern media for storing STI, and scientists and technologists may prefer to use such type of material for documenting their research to improve access, retrieval, explanation and analysis. Some scientists or technologists may use the cassette extensively to record research findings or activities as they find writng or typing more cumbersome and time consuming.

5.22 The inventory should include and identify these machine-readable cartographic and audio-visual records in government agencies, and should treat them as equally important as textual records. For non-textual record series or sub-series in any agency, the inventory should indicate the type or the characteristic of the material e.g. cassette, tape, microform, slides, etc. Although non-textual may not necessarily constitute a series or sub-series, they will have to be itemized in the preliminary inventory.

6. IDENTIFICATION OF PRIMARY AND SECONDARY STI RECORDS IN GOVERNMENT OFFICES;

6.1 The basis of a systematic study of techniques for retrieval of STI in government records will depend on the identification of the bulk of STI sources generated by the government departments and agencies.

6.2 Scientific and technical information, as previously notes, is generated by government departments and agencies as a result of mission and subject-oriented research and development activities sponsored by the state. There exist government departments specially established to carry out scientific and technical research. Others may not be directly involved in such research, but would employ scientists and technicians in their institutions to carry out the various functions of such public office. Many different research and development divisions in government departments undertake work for the general benefit of the people of a country where

private initiative is lacking or inadequate.

6.3 It is estimated that government institutions supported by public funds generate a substantial amount of new scientific and technological knowledge as a result of their activities. As governments spend large sums of public money on such activities, serious efforts should be made to ensure that the public reaps the benefits of this expenditure. Accordingly, identification, retrieval and dissemination of this material to people engaged in scientific and technical work at the grass roots level such as mechanics and foremen should be a national endeavour. Moreover, a clear picture of these sources would enable the personnel in the National Archival agency and record managers to identify and select the relevant material necessary for inclusion in inventories and record schedules.

6.4 The vast amount of STI sources created in government institutions and agencies may be broadly divided into two groups. viz; Primary Sources and Secondary Sources.

6.5 Primary Sources include original, contemporary, manuscript, typed, published or unpublished material in any form or with any characteristics. This would include material documented on paper as well as stored in machine-readable form.

6.6 Primary scientific sources would include reports of scientific expeditions; laboratory notebooks experiments with findings and conclusions; memorandua; diaries, raw data (statistical and tables); internal research reports; scientific and technical working papers; notes on science and technology research, drafts of science and technology articles or papers; manuscript revisions of lectures or addresses; conference proceedings and notes on science and technology articles, manuscript and typed for publication; consultation notes with other scientists or organizations; correspondence on science and technology; slides; maps; specimen drawings and charts; thesis and dissertations. Science and technology reports are an important media used by scientists and engineers to communicate the results of their research and development activities and the first documentary record of new knowledge in their fields.

6.7 Non-textual primary sources of science and technology would include oral recordings and oral communications; discussions with colleagues and visitors, local and abroad, engaged in similar type of research on science and technology; conference proceedings on magnetic tape or cassettes; microforms, cinefilms; video tapes; and computer tapes.

6.8 The personnel engaged in scientific and technical research have an invisible college of colleagues with whom they discuss their work and from which they obtain informational help. Some do not rely upon published science and technology literature to learn about major developments.

6.9 The nature of primary science and technology sources indicates that they are widely scattered in organizations, disconnected and unorganized. They record information, but 90 percent of that information is unassimilated to the body of scientific and technical knowledge, much practical research information never appears in the literature. Although of vital importance to the development of science and technology there had been little effort to locate, identify and retrieve those STI using an appropriate conceptual framework.

6.10 Primary technical sources in a strict sense, include material not of purely scientific character but of special significance, such as product data, results of measurements, surveys of particular fields, patent information, technical research reports, product information, data bases, and trade catalogues, also included are technical hand books and manuals in manuscript, typed or mimeographed form.

6.11 Secondary sources. The importance of secondary sources in science and technology, lies in the fact that research is not regarded as complete until the results are made available publicly. Most scientific and technological research passes through four stages; observation, hypothesis, experiment and conclusion. However, not until the results are published can they be of value to the community.

6.12 Scientific and technical articles submitted for publication form the principal means of reporting results of research and development originating in many government departments. Most contributed papers arise as a result of the desire of the staff engaged in science and technology research to see their work published, although additional publication result from an administrative decision that work on a certain subject should be publicly recorded. As a result, science and technology journals published by public institutions, although printed in large numbers disappear in quick time and are no longer available or one or two copies available in a library for retrieval of information. A survey of public institutions to highlight these journals would be time consuming and only a draft copy would be available in a project file for reference. The information found in these journals may be available in microform, or microfiche as a result of the creating agency adopting a space-saving policy.

6.13 Technical magazines are those publications which contain general information and timely articles on scientific and technical subjects. They are useful means of publicizing work done in government departments and serve also as a means of propagating knowledge between scientific and technical disciplines.

6.14 Most government departments produce technical reports, but the distribution of such reports is deliberately restricted as the information is usually classified.

6.15 Progress reports are issued by public offices giving an account of work performed by the institution. These reports may record scientific and technical progress achieved by an office.

6.16 The generation of pamphlets is usually carried out by the information division of a public office. Pamphlets are directed mainly to extension workers, food processors, foreman and the like, those who are non-specialists but users of information.

6.17 Sources of STI and main channels of information transfers and retrieval are shown in Figure 4.

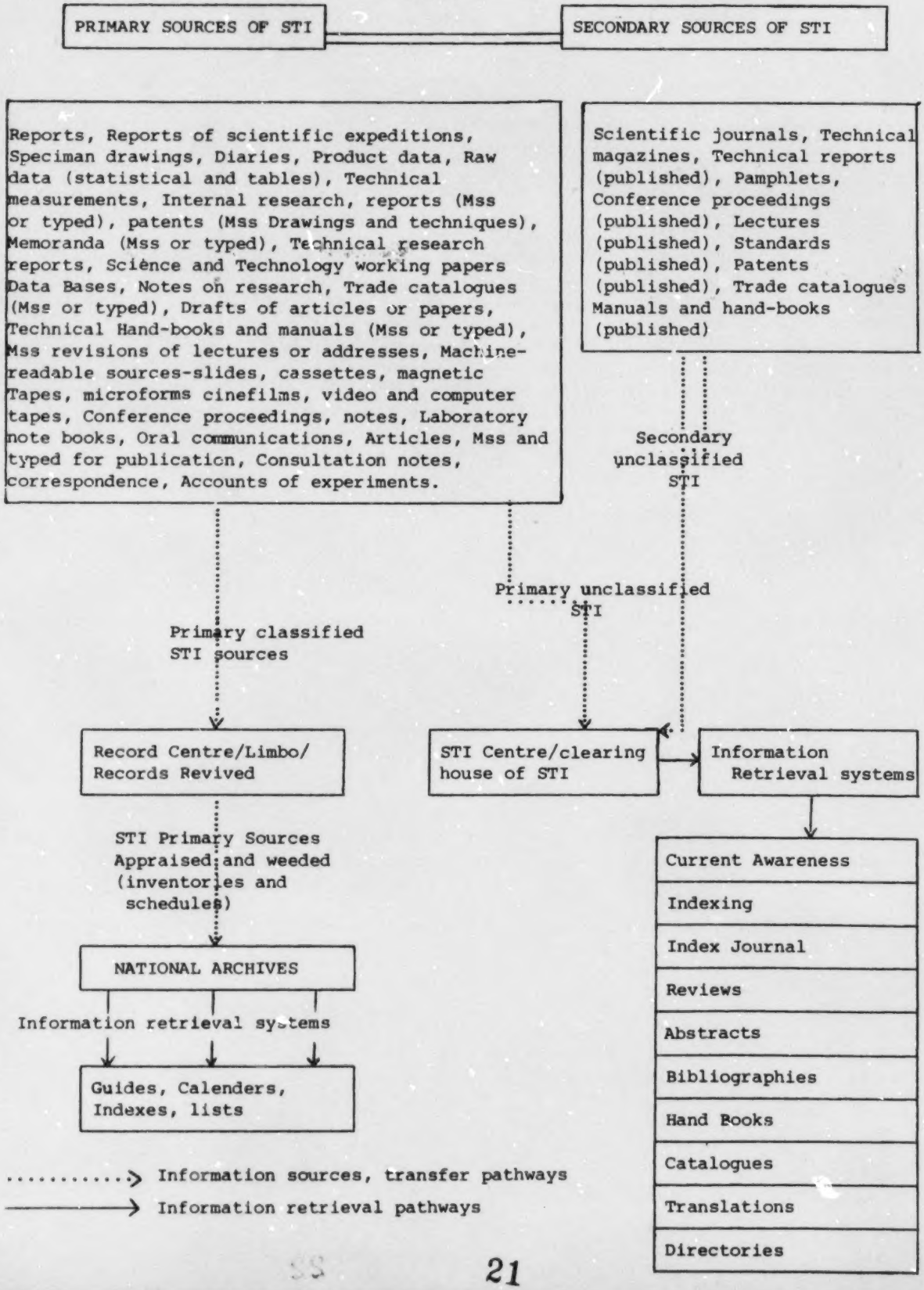
7. A METHODOLOGY TO RETRIEVE AND DISSEMINATE STI IN CURRENT FILES OR RECORDS;

7.1 A survey of registry and filing systems would reveal that where the National Archives or the Records Administration Service has no control over the creation and maintenance of current records in goverment agencies, system differs not only from one agency to another, but sonetimes also within the various divisions of a particular agency.

7.2 Some countries, especially former colonies, have inherited registry and filing systems from their colonial period and the majority of these countries still carry on the traditional systems. However, some Third World countries since gaining independence have changed their filing and registry systems in public offices to suit local needs. In advanced countries these systems are becoming increasingly automated and the storage and retrieval of STI will become relatively simple. Some adopt complex but efficient systems, which others use simple yet efficient ones for varied operations even within a single office.

FIGURE 4

STI Sources, Channels of information transfer and Retrieval


PRIMARY SOURCES OF STI
SECONDARY SOURCES OF STI
Reports, Reports of scientific expeditions, Speciman drawings, Diaries, Product data, Raw data (statistical and tables), Technical measurements, Internal research, reports (Mss or typed), patents (Mss Drawings and techniques), Memoranda (Mss or typed), Technical research reports, Science and Technology working papers Data Bases, Notes on research, Trade catalogues (Mss or typed), Drafts of articles or papers, Technical Hand-books and manuals (Mss or typed), Mss revisions of lectures or addresses, Machine-readable sources-slides, cassettes, magnetic Tapes, microforms cinefilms, video and computer tapes, Conference proceedings, notes, Laboratory note books, Oral communications, Articles, Mss and typed for publication, Consultation notes, correspondence, Accounts of experiments.
Scientific journals, Technical magazines, Technical reports (published), Pamphlets, Conference proceedings (published), Lectures (published), Standards (published), Patents (published), Trade catalogues Manuals and hand-books (published)
Secondary unclassified STI
Primary unclassified STI
Primary classified STI sources
Record Centre/Limbo/ Records Revived
STI Centre/clearing house of STI
Information Retrieval systems
STI Primary Sources Appraised and weeded (inventories and schedules)
NATIONAL ARCHIVES
Information retrieval systems
Guides, Calenders, Indexes, lists
Current Awareness
Indexing
Index Journal
Reviews
Abstracts
Bibliographies
Hand Books
Catalogues
Translations
Directories
Information sources, transfer pathways
Information retrieval pathways

7.3 If the legal and institutional framework of a particular state does not warrent the management of current records to be vested in either the National Archives or the Record Administration Agency, as an alternative the Ministry or the Public Agency responsible for the Public administration of the state could be associated with standardizing and streamlining the systems of record creation and maintenance in public offices.

7.4 All government departments and agencies create and receive a large amount of records in their day to day activities. This large sum of records created in public offices which must be identified, carried from point to point, acted upon and preserved for later reference and finally disposed of. To ensure that records are efficiently handled, a sound office system has to be maintained. This is a definite uniform and pre-set plan for the carrying on of the work of public offices and the administration of records in connection with such work.

7.5 The current records administration in an office begins with the in-coming daily mail, its registration, and distribution, and the filing of documents in folders or covers. The letters and papers received and created within an office as a result of various transactions connected with the function of the institution are filed in file folders in some convenient order. In some public offices in-coming letters and documents are entered in a register called the 'Inward Letter Register'. This Register indicates the date of receipt, the reference number and the date of the letter from whom it was received, etc. Similarly, all letters despatched from the offices are entered in an 'Outward Letter Register'. This system of registration is designed to facilitiate recording and tracing of papers for action.

7.6 Even if a system of registration of letters and documents is not in operation, papers or records received in an office are filed to keep them together. Normally, papers relating to similar transactions or subjects are filed together, creating 'subject files' or 'project files'. The papers in these files are also arranged in chronological order. Although instructions are given not to file any papers of a transitory interest or trivia, experience has shown that many ephemeral papers are filed in transactional or subject files. This may be a result of an unsystematic or unplanned system of creation of records. According to the particular transactions of business in a public office, there may be Case Files which are related to the Subject Files. Sub-Files or complicates cases; policy files, containing papers which relate to a subject or matter; Project Files, Report or Data Files, and Control Files, containing periodical reports. All the above categories of files may be created in a public office as a result of transactions in conducting its varied functions and activities.

7.7 The administration of current Transactional Files in public office is generally carried out according to one of the following two types of office systems: (1) work in the public office is divided into divisions or sections, and is performed through a set of officers called 'Subject-Clerks' or 'Subject Record Officers', responsible for storage and retrieval of information from the transactional files; or (2) a centralized filing system exists where the files are kept in a central depository of the institution and are retrieved by the particular File Officers or File Clerks responsible for the subjects assigned to them.

7.8 In addition to the use of movement cards in order to retrieve files as and when requested, master file registers and card indexes are maintained to control the administration of current records. Under the file register and card index system, the following details are maintained on every current file or record for easy retrieveal of files and information therein:

(1) The reference code of the file/record.
(2) The title or subject of file.

(3) Date of creation of file.
(4) Location of file.

7.9 The files are either arranged under a subject code system following the alphabetic arrangement or under a file code reference or numeric system. Sometimes an alpha-numeric code is used in arranging current subject files, and even Dewey Decimal or other decimal systems to suit the subjects of the transactional files. Although the alpha-numeric or Decimal Classification system is used to retrieve subject files in public offices, the disadvantages of these systems could be shown in attempting to retrieve STI found scattered in transactional files, filed with other trivial and ephemeral papers, connected or unconnected with the main STI sources. Experience has shown that the titling of subject or transactional files has been misleading, and that by following only the title given to a particular subject file one may completely fail to preserve and retrieve important STI found in such files.

7.10 Several examples of file titles and the valuable STI material they contain will illustrate this point:

(i) Sample file:

Organization: Government Statutory body
Subject file No.: LAB/33
File title: Flotation pilot plant for gypsum
Pagination in file: 1.151
STI found in file: equipment for mining (Technical catalogue)
Pagination between document 147 and 148 of STI

(ii) Organization: Government Statutory body
Subject file No.: DEV/CSI
File title: Census and Statistics Department
STI found in file: Common Salt Production--1979

(iii) Organization: Government Statutory Body
Subject file No.: LAB/52
File title: Sodium Silicate
STI found in file: Local manufacture of Sodium Silicate (A Report) No. 43/9/17/5C.

7.11 The three examples given above would indicate that by simply using the file titles in transactional files could prevent a government office from identifying and retrieving STI sources in its custody. Valuable and important STI is thus lost and not retrieved for the benefit of the community at large. Even a scientist or technologist trying to retrieve information by using only the subject titles given by the public office will be misled or frustrated.

7.12 Accordingly, a different methodology should be used in order to identify and retrieve STI in current transactional files.

7.13 The use of a Current Records Schedule could be adopted to identify and retrieve STI for either a departmental Library/Information Centre or National Science Information Centre, or both.

7.14 One of the efficient tools used in Records Administration, a schedule could be drawn up using basic data from the current files inventory shown in Figure 3. However, the schedule should highlight certain basic information, using Alpha-Numeric codes as reference guides to STI. In addition, abbreviations could be used to specify the characteristics of the STI source material. (See Figure 5 for a model schedule indicating current STI records).

FIGURE 5

SCHEDULE OF CURRENT RECORDS/FILES IN PUBLIC OFFICES CONTAINING STI

Name of PUblic Office/Institution:

Branch/Division:

Name of Officer responsible for current files:

Name of Officer prepared the Schedule:

Date of Preparation of Schedule:

Abbreviations used in identifying STI in Transactional Files

S - Scientific	Con - Conference	Da - Date	T.J. - Technical Journal
T - Technical	Nt. - Notes	M - Map	Pamp - Pamphlet
Doc - Document	Rep - Report	Ch - Chart	T.M. - Technical Magazine
Drw - Drawing	Op. - Open	Cl - Classified	

+ Concrete Sample entries extracted from a public office are shown in the Schedule.

Serial No.	File Ref.	Title of file	Original/ Mss/Typed	Date of creation	Specific Title of STI	Ref. Code of STI	Language	Location	Access
1	Dev/N/H/60	MISC. Data	Mss.	10.10.1960	Quality of salt	S/6-8/Doc /60	E	Room 83	Op
2	do	do	Typed	12.06.1961	Iodised salt	S/20-23/ Rep/60	E	do	do
3	do	do	do	01.09.1961	Salt Industry in Sri Lanka	S/40-50/ Rep/60	E	do	do
4	GS/G/23/3	Coastal Zone	do	19.05.1973	Sri Lanka's shoreline status Report	T/10-15/ Rep/73	E	do	do

7.16 The four sample entries in the schedule indicate STI material filed in transactional files and a method for retrieving the information, using an abbreviated code in column 07 of the schedule. (Figure 5) Sample entry No. 01 in the schedule indicates the title of the file--'Miscellaneous Data'--given by the public office which created it, and the valuable scientific information it contains.

7.17 The STI is retrieved in the first entry in the model schedule as follows. The heading of column 7 is given as Reference Code of STI.

Code: -S/6-8/Doc./60
Description of the Code

S - is used to notify that it is a scientific document.

6-8 - is referred to as the pagination of the file in which the specific STI is found.

DOC - is the abbreviation for Document used to describe the nature of the STI source.

60 - refers to the year the STI source was created.

7.18 Likewise, any STI could be indicated using the appropriate abbreviations, depending on the nature and the character of the document found in the current transactional files. Any abbreviation used in the schedule must be explained at the beginning of the schedule.

7.19 To compile a current record schedule containing STI as described above, the operational structure is vitally important. The accurate and speedy compilation of such a schedule to retrieve important STI for users requires trained personnel. This work could be done by Subject Clerks or Record Clerks possessing and handling the Transactional Files, supervised by the Record Inspectors attached to the institution. The designation of these officers may vary from country to country.

7.20 The National Archival Agency and the National Scientific Information Centre should collaborate closely to operate the programme of retrieving STI from current files. The programme would receive the highest co-operation and support from the Ministry in charge of Public Administration, the heads of public institutions and the officers involved in preparing the schedule. The National Archival Agency and the National Scientific Information Centre should supervise the programme closely.

7.21 All personnel involved in the scheduling work be given orientation and training regarding the nature of the work involved, viz., the identification, listing and retrieval of STI from a schedule described above. The training of officers could be organized by the National Archival and the National STI centre.

7.22 It is important to remember that unlike the preparation of the Record Inventory, for the purpose of a STI survey using the Series as the basic level for records control, the 'Records Schedule' for the retrieval of STI should, use a Document-by-Document or Folder-by-Folder listing of Transactional files. Accordingly, File Unit is the basic level for the identification and retrieval of STI.

7.23 File units usually consist of folders, within which individual documents may or may not be fastened together. Volumes containing individual case or subject files and dossiers also constitute file units; the documents within them all relate to the same transaction or are closely related to the same subject.

7.24 Non-textual records, should also be identified and listed in the same schedule with certain modifications of the schedule. Two examples for the identification and retrieval of STI in Machine-readable records from a modified schedule are shown in Figure 6.

FIGURE 6

Retrieval of STI in Machine-Readable records

Abbreviations Cl.-Classified Op.-Open Ca.-Cabinet

Reference to Machine-Readable Record	Contents of STI in Machine Readable Records	Nature of the record	Playing Time	Negative or Positive	Source	Location	Access
e.g. Cassette No. 01	Techniques of Preservation of ancient buildings	Cassettes	01 Hr	--	Conference Proceedings	Ca/01	Cl.
Slides Nos. 1-30	Insect enemies	35mm Colour Slides	01 Hr	Positive	Lectures	Ca/3	Op.

7.25 The dissemination and access to current STI in files is as important as same as the retrieval of STI. Survey schedules of STI in public offices should be transferred without delay either to the National STI centre or to a National Documentation Centre for necessary documentation at these centres. Dissemination to potential users should use the modern techniques of STI retrieval, operated by the National STI Centres, such as guides, indexes, catalogues, abstracts.

8. ACCESS TO STI IN CURRENT FILES

8.1 The easy and timely access to scientific and technological records created by government departments has been a long debated subject. Realizing the importance of improving access to information, the Intergovernmental Conference on STI for Development (UNISIST II) in 1979 emphasized the fact that member states should ensure access to STI needed to contribute to the development of Science and Technology and their application to socio-economic development. The importance of smooth and speedy access to current STI in government records readily available to planners, decision makers and administrations is a vital and continuing requirement of present day research and development activity. Speedy access to STI is especially, needed to meet both current and future needs in planning and implementing development programme.

8.2 The very nature of STI, unlike other information sources, and the type of users using STI, are the two important factors to be considered in devising an access policy for current STI in government departments. Part of the stock of STI necessarily becomes obsolete or out-dated as new scientific and technological advances are made, and the majority of the users are more or less of high standing in society, such as scientists, engineers and technologists. It is also pointed out that STI is inaccessible to the average man at the grass-root level needing STI, viz; farmers, foremen, technicians or mechanics, STI is usually intended mainly for research workers in university or other laboratories, and also rarely is it considered a social or economic resource by the average man. The development of scientific and technological knowledge depends on the communication of new theories and new experimental observations to others. No new idea is afforded acceptance in the scientific community until it has been discovered and evaluated by the people knowledgeable in that area, where knowlege of the ideas and background for evaluating is derived from both formal and informal communications.

8.3 A relatively wide range of STI documents or data are withheld from general circulation for reasons of collective or national security, defence, competition for profit or prestige, sensitivity, and research priorities. In the case of current records in government departments, access is much more restricted to safeguard the privacy of public servants and secrecy of government financed science and technology research which may be purpose-oriented or mission-oriented, whether performed under contract or on-the-job. Information on financial, commercial, scientific or technical matter which might be misused if permaturely disclosed is exempted from public access.

8.4 Existing access rules and regulations for current files would indicate that a proprietory attitude exists in many government departments, where no definite statutory provisions provide for easy access. Access to current records in government agencies is normally a departmental prerogative of the head of the institution or the ministry or body controlling the departments, although in some countries it is at the discretion of the Head of the National Archives.

8.5 More serious difficulties arise from non-availability of current records due to security classification. In some government agencies current files are classified as "secret" "Restrictied" "Confidential" "Not for Publication" and "Proprietory" The actual degree of protection which attaches to each security marking will vary from one government istitution to another. All security classified government records are safeguarded and protected against unlawful dissemination, duplication or observation because of their importance to national defence or to the continuing competitive advantage of commercial organisations.

8.6 The term classified as used here refers to the degree of secrecy which prevents disclosure to unauthorised persons. Each current document in security-classified files has its own social and political frame of reference.

8.7 Although restrictive attitudes to access have been challenged and criticised at international conferences, and attempts have been made by the International Council on Archives and UNESCO to promote a uniform policy of access to the current records and archives of science and technology created by government agencies, it is not to be expected that the present socio-political criterial upon which restrictive policies are based will soon be changed by statutory decision, even if it were recommended by an international group of expert scientists, technologists and policy makers.

8.8 The action programme proposed above to identify and highlight STI in current files and the retreival and dissemmination techniques suggested would be largely ineffective if no concrete statutory provisions are provided for the fuller access to STI in government agencies. As STI is a vitally important factor in the

development of a country, liberal access rules and regulations should be formulated to reap the fullest benefit of STI to the country and its community. If national legislation is to be suggested regarding access to current files in government departments, such legislation should include measures for declassification,reducing time limitations for document circulation, and revision of criteria for document classification.

8.9 Current STI will suffer significant loss of value and relevance under strict access rules, which lead to unnecessary waste of budgets for scientific and technological research' In the long run, conservative access rules to current STI in government agencies will be a major obstacle to programmes of national development. The liberalization of access to STI in a keystone of development, especially in countries, where the import of STI in expensive and dilatory. The harnessing of local STI is more easy and appropriate in these countries, and free and easy access to STI in thus vitally important.

9. RETRIEVAL AND DISSEMINATION OF INFORMATION OF STI IN RECORDS TRANSFERRED TO A RECORD ROOM OR RECORDS CENTRE (LIMBO)/PRE-ARCHIVAGE.

9.1 The current records of government agencies become semi-current or non-current depending on the frequency of their use in carrying out the activities of the institution. The standards for the selection of semi-current and non-current records based on frequency of use differ from one country to another, as well as among institutions within the same country. As a general rule, according to the frequency of use semi-current records would be those not referred to more than four times in a twelve-month period and the non-current records would be those not referred to more than twice in a twelve-month period.

9.2 Retirement and disposal procedures for semi-current and non-current records also differ from one country to another. However, a recent and more systematic study and recommendations on the retirement procedure for semi-current and non-current records could be obtained from an UNESCO study.[1] Some of the techniques used in the following sections of transfer of semi-current and non-current records are based on a study prepared by the present author.[2]

9.3 The tool that should be used for the transfer of semi-current and non-current files containing STI is the schedule. According to the varied records management systems in operation, the retirement of these records could be made to a Record Room of the creating agency, situated in close proximity to the creating body, or to a Record Centre of Limbo, situated some miles away but easily accessible from the creating agency. The idea of retirement of semi-and non-current records to reduce storage costs is a vital stage in the life-cycle of records.

9.4 In some countries records are finally reviewed for disposal before transferring to a low cost storage, but in most countries only the first review, indicating the disposal action is given. In such case a second or the final review has to be made in the Record Centre.

9.5 The operation of Record Centres also reveals a variety of policies and practices, the more common being one in which administration is divided among the creating agency and the National Archives has full control over Record Centre operations.

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1. Evans, Frank. B. The Republic of Cyprus: Development of an archival and records management programme, Ref. FMR/PGI/81/166, pp. 15-19.
2. Wimalaratne, K.D.G. Sri Lankāwā Rajye Lēkhana Kalamanākaranaya, (Administration of Public Records in Sri Lanka), (Unpublished), Typescript. pp. 57.

9.6 Whatever the system used in a Record Room or in a Record Centre, the most vital and imporant function of these intermediate record repositories is to temporarily store the records and retrieve the information in the files or to physically produce the whole file or record when requested by the creating agency. In the performance of this storage and retrieval function, STI in these files may be retrieved and disseminated using well-established tools and techniques of information retrieval.

FIGURE 7

Transmittal schedule for transfer of semi-current and non-current STI records to an intermediate storage/Records Centre/Limbo

Abbreviations

S/c - Semi-current records
N/c - Non-current records
(C) - Closed records
(W) - File weeded

S - Scientific
T - Technical
R - Permanent Retention
Tr- Transfer to the National Archives

D/5 - Destroy/Period mentioned in years
RV/5 - Review - do -
cl - Classified
Op - Open

Transferring institution:.....

Transferring Branch/Division:.....

Name of Officer responsible for the schedule:.....

Date of Preparation of Schedule:.....

Linear metres of records transferred:.....

Date of Transfer:.....

Signature of Officer receiving records:.....

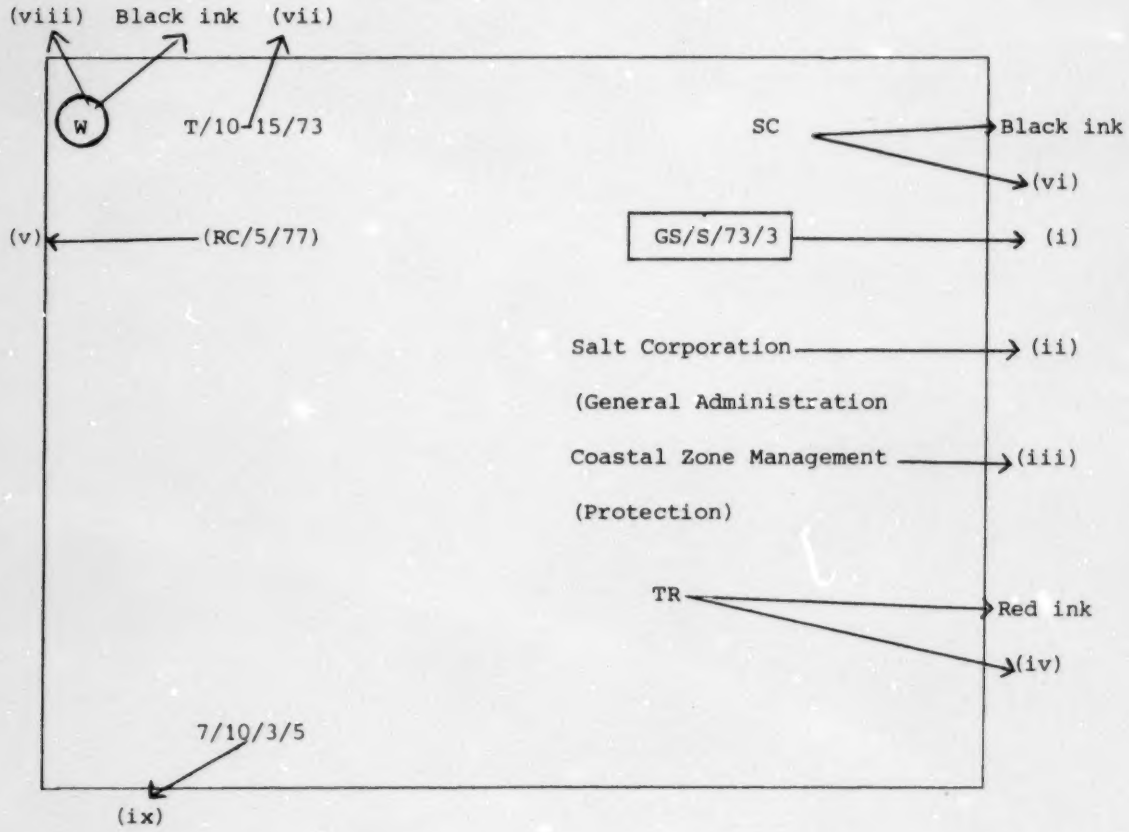
Duplicate copy sent to the creating agency:.....

Serial No.	File Reference	Subject/file Title	Covering dates of file from - to	Pagination in file	Specific Ref. Code to STI in file	Status of file Access	Disposal Action	Location in Limbo (Box/Rack/Shelf/Bay	Date of Review 1st Rev. 2nd Rev.	Record Centre Ref.
1	GS/G/73/3	Coastal Zone Management (Protection)	19.05.1973 10.10.1975	1-80/ (W)	T/10-15/7	N/c.Cl	Tr	7/10/3/5	19.5.1976	RC/5/77
2	DEV/N/H/ 60	Miscellaneous Data	10.10.1960 11.10.1965	1-25	S/6-8/60	N/c Op	D/ 05	9/7/5/7	12.5.1965 07.5.1975	RC/7/77

9.7 The schedule given in Figure 7 could be used by Government agencies transferring their semi- and non-current records to a Record Room or a Record Centre. In the procedure of an annual transfer, the schedule in Figure 7 could be modified to include specific references to STI. Column 6 of the schedule would give specific reference to STI while the other columns are those of standard transfer schedules. The schedule is completed in duplicate and when the records are received by the Record Centre, column 12 is to be completed by the Record Centre official, indicating the location of the files. The sample code shown in column 12 of the schedule, e.g. 7/10/3/5, is explained as Box/Rack/Shelf/Bay respectively. If there are no boxes to store the records in a Record Centre, the first digit in the above code could be dropped. Other columns of the schedule are self-explanatory. The original copy of the schedule should be retained and filed by agency, branch, and series. A second copy is returned to the government agency or branch which transferred the records. All semi- and non-current files transferred to a Record Centre should bear on the file covers the symbols and code references given in Figure 8 (below).

Figure 8

Sample - File/Folder/Cover indicating the Symbols and code references to STI



9.8 All semi-current and non-current or closed files should be transferred with the basic details indicated above on the file cover in order to facilitate both retrieval of STI and disposal action.

9.9 The explanation of the reference and details given in Figure 8 is as follows:

(i) File Reference/File code given by the creating agency at the stage of creation of file.

(ii) The name of the creating agency.

(iii) The subject/title of file.

(iv) Disposal action-abbreviations explained in Figure 7.

(v) File reference/code given by the Record Room or Record Centre officials.

(vi) The status of file. Abbreviations explained in Figure 7.

(vii) Specific reference to STI in file.

(viii) The symbol to denote whether it is a weeded file before transfer.

(ix) The location of file in the Record Room/Record Centre. (Rack/Shelf/Bay/Tray).

9.10 Of the references shown in Figure 8 above, only item Nos. v, vii, and ix should be filled by the Record Centre officials. Other details should be provided by the agency officers before the files are transferred to the Record Centre. The exact positions of the reference codes given in Figure 8 (Sample File Cover) should be followed for clarity and uniformity.

9.11 Upon receiving annual file transfers from the government agencies, Record Centre officials could prepare a schedule in duplicate as shown in Figure 7 but indicating only the details of STI files transferred to their custody.

9.12 The original copy of the schedule indicating STI files could be sent to the National STI centre or Government Information Centres established for the dissemination of STI. The National STI centre could give all the possible information to users and direct the persons to the Record Centre with a letter of introduction authorizing to use the STI files deposited in the Record Centre. As the schedule (Figure 7) indicates in column 8 the status of accessibility of the specific reference required by the researcher, anyone expecting to use the material on STI deposited in the Record Centre will know in advance if authority is to be obtained prior to the visit to the Record Centre.

10. ACCESS TO STI IN RECORDS DEPOSITED IN THE RECORD CENTRES

10.1 Access to STI in records deposited in Record Centres is vital, as these records have reached a mature stage in their life-cycle. It is important to consider that records transferred to Record Centres are the ones agencies no longer require in the conduct of their current business. Accordingly, these records have actually lost the immediate value for the creator, but will be of importance for the researcher. Especially, STI in these records will be of national importance for the local scientists and technologists who would make use of it for national development. Moreover, STI in scientific and technological agencies will be of most value to the creator of these records. Therefore, rigidly uniform and conservative access policies should be revised regarding files containing STI for local scientists and technologists, attached to the Government agencies, and working in the science and technology fields. A system of periodic downgrading and declassification of STI files in a Record Centre would help to open many categories of records classified at the time of

their transfer to the Centres. A uniform policy of a 30 year or 50 year rule of access to STI deposited in Record Centres would be a disadvantage in the retrieval of STI for the development of national resources.

10.2 Records transferred to a Record Centre will generally be administered jointly by the officials of the creating agencies and the National Archival Agency. In this instance the National Archives could work in collaboration with the National Scientific Information Centre to seek advice in suggesting what types of STI should be released for research workers using the STI files in Record Centres. Officials of the record-creating agencies may adopt a restrictive policy regarding files they have classified at the time of transfer. However, after close collaboration with the National Scientific Information Centre and the National Archival Agency, many classified files could be declassified when the importance of the STI material for national development ventures is emphasized. To promote liberalization of access to STI, a strong campaign is essential by the National Scientific and Technological Information Centre and the National Archives, to point out to the creators the advantages of the early utilization of STI.

10.3 A system could be established in accordance with which a recommendation authorized by the National Scientific and Technological Information Centre and the National Archives could help to open classified files containing STI that are deposited in the Record Centres. While still protecting the rights and interests of the State and its actions, a bonafide research worker could nevertheless gain access to STI deposited in the Record Centres, supported by the National Science and Technological Information Centre and the National Archives.

11. APPRAISAL AND DISPOSAL OF STI FILES DEPOSITED IN RECORD CENTRES.

11.1 The appraisal of records for disposal is one of the most important and sensitive problems of records and archives management. It is considered as one of the highest professional functions of the archivist. Difficulties in finding standards for appraisal to suit every agency which creates records and the impossibility of implementing a fixed scheme of appraisal makes it a challenging function for the appraiser.

11.2 To solve the difficult task of appraisal, general guidelines have been recommended after numerous discussions by professionals. The determination of records values is basic to records disposition activities. The record values depend on the understanding of how agency activities are documented; the administrative history of the agency and its branches in which the records originated; familiarity with scholarly principles, practices, needs and trends; and the appreciation of the importance of preserving evidence of the past to be utilized for future development of the country. This involves the assessment of the data available in records, usually long after they have ceased to have any value to the creating agency for current business.

11.3 Based on long experience, records values have been generally identified as primary and secondary.

11.4 Primary value of a record is defined as the immediate and future usefulness of the record to the creating agency for administrative, legal, fiscal, scientific and technological purposes.

11.5 Secondary value of a record could be defined as the value of records primarily in terms of their ultimate usefulness to the government and the community, for purposes of (a) documenting and agency's various functions, (b) facilitating research, and the (c) protecting of the civic, legal and property rights of citizens. The secondary values of records depend on the information the records contain on person, things, problems, and conditions with which the agency dealt, normally

described as informational values. The evidential values of records refers to the information they contain that constitute evidence of the organization and functioning of the agency that produced them; the existence of the record as both the vehicle for administrative action and the product of that action gives them their evidential values.

11.6 As is clear from the record values enumerated above, records on and containing STI have both primary and secondary values, since they contain valuable information for the agency which created them, as well as for other uses later in their life-cycle.

11.7 Some professional archivists feel that entirely different appraisal principles should be applied to science and technology records. However, when appraising science and technology records, it is important to remember that they consist largely of record series which are similar to the other types of records created by government offices although science and technology records may contain specialized information, used by scientists and technologists.

11.8 Records having STI may consist of large quantities of technical data gathered as a result of pure and applied research. If the data are not immediately or if the research results remain unpublished, the records may then require a longer retention period. The nature of scientific inquiry may make appraisal difficult. Occassionally, a record containing information on STI which is long dormant may suddenly become important as a result of a new discovery. An archivist can come to a wrong appraisal decision if he attempts to evaluate scientific or technical content or to determine the scientific or technical significance of each record. It is advisable to retain a coherent record of the activity that created the files in which the research techniques, methodologies and tools are documented. Under this appraisal principle one would retain not only the records of novel scientific discoveries or techniques, but also the total achievements of a public agency in the field of science and technology in general. Records of a purely scientific character are clearly suitable for archival preservation. They contain data on experiments and investigations. Their value for preservation is determined by their importance for the history of science or for the conduct of further scientific research. The problem of appraisal arises mainly with respect to records needed for further research, for obviously records pertaining to history of scientific and technological activities in the government are important. When scientific records provide the means of carrying on further research they are clearly suitable for permanent retention.

11.9 Among the transactional files created by public institutions, three types of statistical data relating to scientific and technical activity are found. Sometimes these data are the most difficult to appraise. These include (a) data about the activities of science and technology, usually created for administrative practices, (b) raw data of observations, experiments and tests, and (c) data collected for analysis and research.

11.10 The first type of data described above cast light upon the kinds of activities which comprise and characterize science and technology, and may be retained for the insights they provide into the organization of these activites, taking into consideration the primary value of these type of records. These record series, containing data created more or less annually, and published by the creating agency in other forms, viz; printed or mimeographed statistical reports, microform publications, etc., might be sampled rather than preserved in their entirety. If the files document techniques used to collect the raw data, random sampling could be used to select a few files as evidence of such techniques and systems employed in collecting science and technology data. If the techniques and systems of collecting data were changed in certain years, chronological sampling techniques could be used, together with random and illustrative sampling, showing the intervals of change in the basis of collecting data. An example of chronological sampling is given below.

11.11	Record Series	Inclusive Years	Number of files
1.	Collection of raw science and technology data in files	1970-1975	50

Sampling Techniques: (a) Select any two files out of the 50 files. (Random Sample)

(b) If there is a change in the system of collecting raw science and technology data in the year 1974, select one file pertaining to that particular year. (Combination of Random and Illustrative Sampling).

11.12 The second type of data that created as a result of scientific observations, experiments and tests, fall into the category of unique informational value and should be selected for preservation. If the scientific data are unique, they might have value for future scientific research. The central criterion in appraising unique scientific data is the exceptional signigicance of the discoveries or the inventions made on the basis of those data. Accordingly, if the scientific data on discoveries or inventions relate to false starts or abortive ones, illustrative sampling of this documentation should be selected in the interest of scholars.

11.13 The third type of data, that collected for scientific analysis and research, needs careful appraisal. If the data relate to organized activity of scientific research and could be made use of for future research, such data should be selected for permanent retention.

11.14 Examples of these date include blood type data and geological survey data. Cumulative records of many experiments on scientific tests could be cited. As products of collective science and technology activity, portraying the research concerns and the organizing capabilities of entire disciplines, these data have a powerful claim to be retained permanently.

11.15 Sample science and technology record disposition schedule

Abbreviations

D - Destroy, D/I - Destroy, period mentioned in years. Tr. - Transfer to the National Archives.

Serial No	Record Series/Sub-series/Item Title	Disposal Action (Use abbreviations)
01	Diaries of Scientists containing experiments, tests or data.	Tr.
02	Laboratory Note-Books	If the contents in Note-Books are used in science and technology publication, the Note-Books to be destroyed, retaining one or two Note-Books as samples.
03	Reprints, without Mss. notes or Correspondence.	D or offer to the Libraries.
04	Working papers	If reserach is published D working papers.

Serial No	Record Series/Sub-Series/Item Title	Disposal Action (Use abbreviations)
05	Drafts of science and technology reports	If the report is published D the Draft.
06	Science and Technology reports	Tr.
07	Conference proceedings	If proceedings are not published retain original proceedings.
08	Science and Technology Journals	If duplicate copies, gift to science and technology libraries. Preserve an Archives Record copy. Otherwise Tr.
09	Science and Technology Pamplets	- do -
10	Technical Journals	- do -
11	(a) Science and Technology Hand-books and Manuals (Published)	Retain sample copy and Tr., if Hand-Books and Manuals are out-dated.
	(b) Do (Mss. or Typed)	Tr.
12	Science and Technology Drawings	Tr. if not published
13	Slides, Charts, Illustrations	Tr. if unpublished.
14	Field Maps, Plans, Sketches	Tr.
15	Magnetic Tapes, Cassettes containing discussions on science and technology.	Tr.
16	Data on science and technology	(a) 'Unique' data to be Tr. (b) Data used in science and technology analysis to be destroyed. (c) Annual collection and science and technology Data as routing science and technology activities to be sampled and destroyed.
17	Standards (a) unpulished (b) published	Tr. Tr. Tr. single copy to the Archives.
18	Patents (a) unpublished (b) published	Tr. Tr. single copy to the Archives.

11.16 It should also be noted that the intervals of appraisal and disposal systems vary from country to country. In many countries, two reviews are carried out, the first review taking into account the primary values of records and the second, the secondary values. The second review is done in the Record Room or in a

in a Record Centre; with both record creators and archivists working out and applying appraisal standards. However, any appraisal procedure or system should be geared to finalize the ultimate disposal of scientific and technology records before they are transferred to the National Archival Agency. Generally, there is no need to appraise the records after being transferred to the National Archives. However, the United States experience of reappraising accrued records to the National Archival Agency could be considered. The defenders of reappraisal of accrued records base their arguments on two vital points. Firstly, that the original appraisal was faulty, as the appraiser would have judged them worthy of accessioning by the standards of the time of appraisal.[2] It may be that the appraiser judged them correctly by the appraisal standards of the time, but the standards would have changed and by today's standards they are not worth preserving. Secondly, the records would have been accrued without any proper appraisal. In these circumstances, the Archivists in the National Archival Agency may re-consider the usefulness of keeping records of questionable value. Accordingly, a reappraisal of accessioned records is justifiable only after a reasonable period of time--may be 20 - 30 years from the date of accrual to the National Archives. As observed correctly by Leonard Rapport, appraising is at best an inexact science, perhaps more an art, under the reappraisal procedure we would be obliged to make a case for continuing to retain records rather, than getting rid of them.[3] Those who reappraise their accrued records should consider carefully what they are going to do, realizing that what they destroy after reappraisal can never be recovered.

12. TRANSFER OF STI RECORDS TO THE NATIONAL ARCHIVES.

12.1 The transfer of records from a Record Room or a Record Centre to the National Archives for permanent preservation is the last stage of the records management programme. This involves usually the transfer of both the legal and the physical custody of records from the agency of origin to the archival agency. The transfer of the custody of records for permanent retention must be fully documented to cover the details of records taken over by the National Archives. The receipt should include a description sufficient to fully identify the records transferred, and an acceptance by the National Archival Agency of access restrictions placed by the creating agency upon the use of the records. This would include the access to STI, depending on the downgrading and declassification of STI as recommended above.

12.2 A comprehensive transfer schedule is given below.

Figure 9

Transfer schedule of records transferred to the National Archives for permanent preservation.

Name of Department/Institution:.....

Name of Branch/Division:.....

Name of officer responsible for the schedule:.....

Signature of officer prepared the schedule:.....

Date of Transfer:.....Name and signature of officer accepting the records:.....

Linear metres of records transferred in schedule..... .....

Number of files transferred in schedule:.....

2. Rapport, Leonard. No grandfather clause: Reappraising accessioned records, The American Archivist, Vol. 44, No.02, Spring 1981, pp. 144.

3. Ibid, pp. 145, 149.

Abbreviations: Cl-Classified, Op.-Open, S-Scientific, T-Technical, Rep.-Report, E-English.

Serial No.	File/ Record Ref.No.	Subject/Title of file/Record	Inclusive dates in file/record	STI Ref. in file	Language	Contents in file Cl. or Op.	STI in File Op/Cl.	Box No. File No.
*01	LAB/33	Flotation pilot plant for Gypsum	1965-1968	T/REP/ 10-17/66	E	Op.	Op.	01/1
*02	LAB/52	Local Manufacture of Sodium Silicate.	1971-1973	S/REP/ 5-7/72	E	Op.	Cl.	02/1

* Two Sample Entries.

12.3 This transfer schedule should be made in triplicate, with one copy each to be filed by the creating agency, the National Archives, and the National STI Centre or Referral Centre, respectively. The main purpose of transmitting a copy of the transfer schedule to the National STI Centre, is to inform the Centre that the particular non-current files containing STI selected for permanent retention have been transferred to a different location. Accordingly, the scientists and technologists calling at the National Science Information Centre in search of STI in transactional files could be directed to the National Archives without referring them to the Record Centre, thus locating the STI files as quickly as possible.

12.4 Columns 6 and 7 in the Transfer Schedule would give a clear indication to the archivists in the National Archives the state of access to the transactional file and, in particular, to the STI in files. As a result of downgrading and declassification as well as the expiration of closed period on STI in files in the Records Centre, the Science and Technology material may be open to the researchers although other documents in the transactional file would remain classified.

12.5 All records transferred to the archives should be boxed and labelled to facilitate their retrieval.

12.6 If machine-readable records containing STI are to be transferred to the National Archives, the column headings of the transfer schedule could be changed accordingly. A sample schedule for the transfer of machine-readable records is shown below:

Abbreviations: E-English, Cl-Classified, Op-Open.

Figure 10

Serial No.	Ref. of Machine-readable record	Subject content of the Machine-readable Record	Physical Type	Language	Classified Open	Box No.
01	No. 01/75 Cassette	Conference proceedings on Architectural Designs	Cassette	E	Op	01/10
02	No. 85/73 Micro-film (Negative)	Architectural Drawings of Historic buildings	Micro-film	E	Op	09/5
03	No. 17/80 Video Tape	Preservation techniques of murals in Ancient temples	Video Tape	Narration in English	Op	10/6

13. ARRANGEMENT DESCRIPTION OF STI FILES/RECORDS IN ARCHIVES.

13.1 When non-current records selected for permanent preservation are transferred to the National Archival Agency, the first step is to establish the degree of intellectual control essential to provide effective reference service on the archival material so deposited. Accordingly, arrangement of archival material is the initial step in the intellectual access to archives.

13.2 The transfer schedule submitted along with the archival material could be used as a preliminary register to gain immediate access to recently tranferred material until final and systematic finding-aids are prepared. The transfer list or schedule could be duplicated, one copy deposited in the research room, and the original utilized for the proper arrangement of archives. Although transfer schedules would give an idea of STI files or material transferred to the archives, in the course of preparation for transfer the files or records may be disarranged or disarrayed accidentally.

13.3 As soon as the transfer lists are received by the National Archival Agency, the archivists could prepare a Record-group holdings of STI, using the basic STI information given in the transfer schedule. If the accrual is from a public institution from which no archival material has previously been received, a new record group number should be given to the accession. Accordingly, a sample of record group holdings of STI could be given in a list as shown below.

Record Group Number.	Name of creating agency	L.M.-Linear Metres. Inclusive years
23	Records of the Coast and Geodetic Survey	1960-1965 - .7 L.M.
27	Records of the Weather Bureau	1950-1954 - 1.2 L.M.

Record Group Number	Name of creating agency	L.M. Linear Metres. Inclusive years.
37	Records of the Hydrographic Office	1970-1975 - .5 L.M.
307	Records of the Atomic Energy Authority	1970-1975 - .9 L.M.

13.4 After the completion of the STI Record Holdings list, the next step would be the arrangement or classification of the material in accordance with the basic archival principles and techniques.

13.5 The principle of provenance has been the basic single doctrine followed all over the world in order to arrange archives deposited in archival agencies. This doctrine emphasizes that records of organizations are created in the course of human activity, and that the resulting organic character of archives is the key to their physical and intellectual control. Provenance is important for control of Archives for two reasons: (i) it can be used as a principle of series arrangement which reflects the structure and activities of the creating agencies, and (ii) since agency functions determine the subjects of the records, provenance-related information about archives can be used to gain intellectual control over large bodies of records.

13.6 The closely related principle of 'respect for original order' (Respect des fonds) is in a sense a corollary of provenance. If indivudual files were rearranged in violation of the original order, the principle of provenance would be violated, since the organic quality of the records would be disturbed. Yet, the original order doctrine should be considered separately from provenance. Accordingly, provenance pertains to the activities and structure of the organization which created the record, it does not pertain to individual file order. The principle of respect for original order pertains to file order within series.

13.7 According to the Principle of Provenance, arrangement of archival material is done at as many as seven levels, (a) repository level, (b) record group level, (c) sub-group level, (d) series level, (e) sub-series level, (f) file-unit level, and (g) document or item level.

13.8 Arrangement at the repository level means the division of the repository's total holdings into a few major and distinct categories, that group seperate archive or record groups and special physical types of records on the broadest possible common denominator, viz; 'audio-visual records', 'scientific and technological records', or 'British Period Records', and the physical placement of each such major division of records to best advantage in the storage areas.

13.9 (b) The 'Record-Group' of the 'Archive-Group' level is the point at which most archivists begin their arrangement programme. This is defined as 'a body of organizationally related records established on the basis of Provenance with particular regard for the administrative history, the complexity and the value of the records and archives of the institution or organization involved. 'It is important to remember that a Record or Archive-Group is analogous to the term 'Fonds' and the term 'respect des Fonds' as popularly and widely used in many National Archival Agencies. Thus, all the records created in an institution, including its subordinate administrative units, are grouped together to form the Records or Archive Group.

13.10 Arrangement at the sub-group level occurs within the Record Group: sub-groups usually consist of the records of a primary subordinate administrative unit. Thus, Record Sub-Groups are records created in the same branch or division within the parent institution. For example, within a sub-group of a public office there may

be sub-sub-groups for the Establishment Branch, Finance Branch, Legal Division, Personnel Branch and so on. If there are no branches or divisions in an institution, records sub-groups may not appear. But then sub-groups, as needed may be created on a functional, geographical, chronological, or 'Physical type' basis.

13.11 The series level is the most important one in arrangement, because here the Archivist expresses the character of the group and sub-groups by the divisions made of it. Work on the subordinate levels merely refines the order within each individual series. Accordingly, the description of archival material focuses heavily on the series; series occur within the Record or archive-group and sub-group, and are those next subordinate bodies of records related by creation, activity, use or form. Professionally, the series is defined as 'file units or documents arranged in accordance with a filing system or maintained as a unit because they relate to a particular subject or function, result from the same activity, have a particular form, or because of some other relationship arising out of their creation, receipt or use. Its elusiveness in definition, combined with its central role in arrangement and description, make the series the most interesting and challenging archival unit.

13.12 (e) Sub-series occur when the series is further structured internally. For example, a division of letters within a correspondence series is sometimes made between 'Outgoing' and 'Incoming' items, although these may be two separate series.

13.13 (f) At the filing unit level arrangement consists of the breakdown of each series or class into its component filing units, and the physical placement of each component in relation to other components in some logical sequence to reveal either the function or content of the individual document, enclosures and annexes that comprise the filing unit. Accordingly, a File Unit is an aggregation of documents brought together, usually for convenience in filing, in such a way it may be treated as a unit. Bound groups of documents and folders of loose items are the most common file units. File units may be arranged according to types, chronological or alphabetical by topic, geography, personnel or organizational name. The file unit is the lowest level at which archivists in larger repositories work, simply because the quantity of material they face affords no time for further attention to any one Record-Group.

13.14 (g) At the document or item level arrangement is simple on a 'single record, document or manuscript item' basis. Single items within the file units are normally filed chronologically, alphabetically, or in a combination of the two.

13.15 Using the seven levels of arrangement, a sample arrangement of archival records in an institution follows for better understanding of the Provenance-based and creator-oriented 'Classification'.

Levels of arrangement University Archives

A Repository - I, Racks I-03

B (Records of the University of Paradeniya) Record-Group or Archive-Group: No. 80 1945-1950

C (Records of the Dean, Faculty of Arts) Record-Sub-group 1945-1949.

D (Correspondence of the Dean, Faculty of Arts with the Vice-Chancellor of the same University)

E Record Series 1946-1948
(Inward Letters) 1946-1947
(Outward Letters) 1946-1947
Record Sub-series Outward Letters A-E

F (General Arts Degree Examination)
File Unit 1946-1947

G (Time Table for the General Arts Degree) Item or Document Level
(Document in File) 1946

13.16 Effective descriptive programmes are as important to a healthy archival operation as are comprehensive systems of arrangement. It is of no use to preserve records if the information embedded in them is unknown to users. Accordingly, to make fully accessible to Government agencies, scholars and the general public the archival resources in its custody, the archival agency should develop and implement a long-range description or finding-aid programme.

13.17 The General Guide to the holdings indicating the Record-group numbers, to the Names of the creating agencies, inclusive years of record holdings, linear metres of individual holdings and their location, should be the initial finding-aid to be prepared. This Guide should be supplemented by the preparation of record or archive-group descriptions based upon the 'Provenance' and 'respect des Fonds' doctrines.

14 EFFECTIVENESS AND EFFICIENCY OF PROVENANCE METHOD FOR THE DESCRIPTION AND RETRIEVAL OF STI IN ARCHIVES;

14.1 S.A.I. Tirmizi, in his Guide to the records relating to Science and Technology in the National Archives of India: A RAMP Study[1], describes STI files or records created by government agencies and transferred to the National Archives for permanent preservation by using the 'Provenance' and the 'respect des fonds' concepts of archives administration.

14.2 In his description of the records of the Geological Survey of India, Tirmizi makes use of the Provenance-Oriented technique and describes the archives in the series level as follows:

(1). Proceedings, 1916-1922 14 Vols.	(.1 lin.m.)
(2). 'A' Proceedings, 1916-1923 2 Bundles	(.5 lin. m.)
(3) 'B' Proceedings, 1916-1923 1 Bundle	(.25 lin. m.)
(4) 'Deposit' Proceedings, 1916-1923-Do	(.25 lin. m.)[2]

14.3 The efficiency of this technique of description for the retrieval of STI for scientists and technologists has been under discussion in many quarters in recent years. In May, 1978, the National Science Foundation in the United States of America convened a one-day metting to discuss the documentation of STI in modern America. It was agreed at this meeting that the broad and diverse concerns of users of Science and Technology records established a prima facie case[3] for re-examining the descriptive practices of archivists serving this community. They were convinced that Provenance is of less use to users in identifying appropriate records for their researches,[4] the committee suggested further study of content access to science and technology records.[5] In two articles published in the American Archivist in 1980,

1. Tirmizi, S.A.I. Guide to the records relating to Science and Technology in the National Archives of India: A RAMP Study, UNESCO, Paris, pp. 1-76, annexes 1-11, PGI/82/WS/12.
2. Tirmizi, OP. cit; pp. 18
3. Report and proceedings of the National Science Foundation in U.S.A., 1978, section 2:5, pp. 21.
4. Ibid, pp. 21.
5. Ibid, pp. 21.

Richard H. Lytle emphasized the importance of the 'content indexing' system as a supplementary to the well-known Provenance oriented system. Nathan Reingold correctly remarked that 'the summation of a series comprising several hundred linear feet into a series entry of a few lines is less and less useful to scholars.[6]

14.4 A scientist or a technologist using a provenance oriented guide in searching for STI in a particular Record Group will have to understand the system of arrangement of the archivist. Large numbers of files arranged under a record series or sub-series may have to be examined to get at the particular file containing subject information in which one is interested. Moreover, the scientist may well be misled by the uninformative file or folder titles given by the creators of records. A classic example is a folder titled 'Miscellaneous Data', containing valuable STI to be used in research. Accordingly, the Provenance method with its classical creator-oriented and file or document-oriented arrangment should be developed further to accommodate thesauri or content indexing in archives. The content indexing system used to retrieve STI will not only help scientists and technologists, who have no browsing time to search for the STI in large mass of archival records, and will also save the valuable time taken by archivists to direct and to frequently personally assist the researcher using Provenance-oriented indexes.

15. A CONTENT INDEXING SYSTEM FOR RETRIEVAL OF STI IN ARCHIVES.

15.1 The description of archival material according to the creator-oriented programme method would not create major problems for the professional archivists in the National Archival Agency. What is needed in STI retrieval is concrete content information, extracted and presented systematically. However, if a content indexing system is to be formulated for STI in archives, it is essential that science-oreinted archivists are employed for the task. It is also proposed that to organize, arrange, describe and retrieve STI in archives, a separate division be established under the National Archival Agency where science educated personnel work in appraising non-current records containing STI in Record Centres and in describing and retrieving information for scientists and technologists when the records are transferred to the National Archives.

15.2 The first step towards making a content indexing system for STI in archives is to work at the filing unit level of archival material under the provenance method. When the arrangement of records of a Record-Group is perfected at the File Unit Level, the files containing STI in a particular accrual could be easily identified by using the transfer schedule of non-current records transferred to the National Archives indicated in Figure 9. According to the methodology suggested in this study, all files containing STI are grid marked on their file or docket covers as they become non-current and are transferred to the Record Centre or Record Rooms. (See Figure 8). The non-current records selected for permanent preservation will bear the same grid marking on the file covers when transferred to the National Archival Agency. Therefore, it is relatively simple to check the transmittal schedule and the files so transferred to ascertain whether they contain STI.

15.3 Once the initial procedures as enumerated above are completed, the archivists in charge of the Science and Technology material in the National Archives could prepare 5" x 3" size index cards for files containing STI material. If there exists computer facilities in National Archives, Scientific and Technical data could be early computerized. An index card should be written for each file identified as containing STI, giving the following details in item form:

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6. Nathan, Reingold, Manuscripts of science analysis and description, American Archivist, 24, (2), April 1961, pp. 163-170.

(1) Subject or Title of STI
(Information could be extracted from column 3 in Figure 9)

(2) File Code or Reference used by the creator of file
(Information could be extracted from column 2 in Figure 9)

(3) Specific Reference to STI in file
(Information could be extracted from column 5 in Figure 9)

(4) Content Index Code or Key Word in Context code.

(5) Language of the STI document.

15.4 Using these details the following specimen index card could be prepared:

Specimen Index Card

FIGURE 11

5"

1.	Flotation Pilot plant for Gypsum
2.	LAB/33
3.	T/REP./10-17/66
4.	Gypsum Plant
5.	E

3"

15.5 The index cards so prepared could be arranged alphabetically, deriving the initial word from content indexing or Key Word in context appearing in item 4 of Figure 11.

e.g. Gypsum Plant
(Index card filed under (G))

15.6 If the archivists preparing the STI retrieval index are science educated, it is better to use the standard vocabulaties or thesauri of specific discipline in science and technology, viz; Chemistry, Biology, Zoology, Medicine, Botany, Physics, Engineering, Architecture, etc. The STI index cards should be filed in alphabetical order within the major divisions of science and technology.

Example of Thesauri Arrangement

Guide Head Card - Chemistry

Guide Sub-Head Card - Acidification

Arranged Alphabetically using
chemical vocabulary or Thesauri- Aerosols Alkalinity

15.7 Samples of head-cards and their arrangement are shown below:

FIGURE 12

(A)

CHEMISTRY

GUIDE-HEAD CARD

(B)

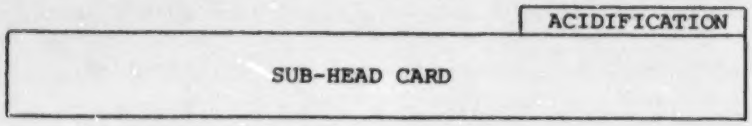
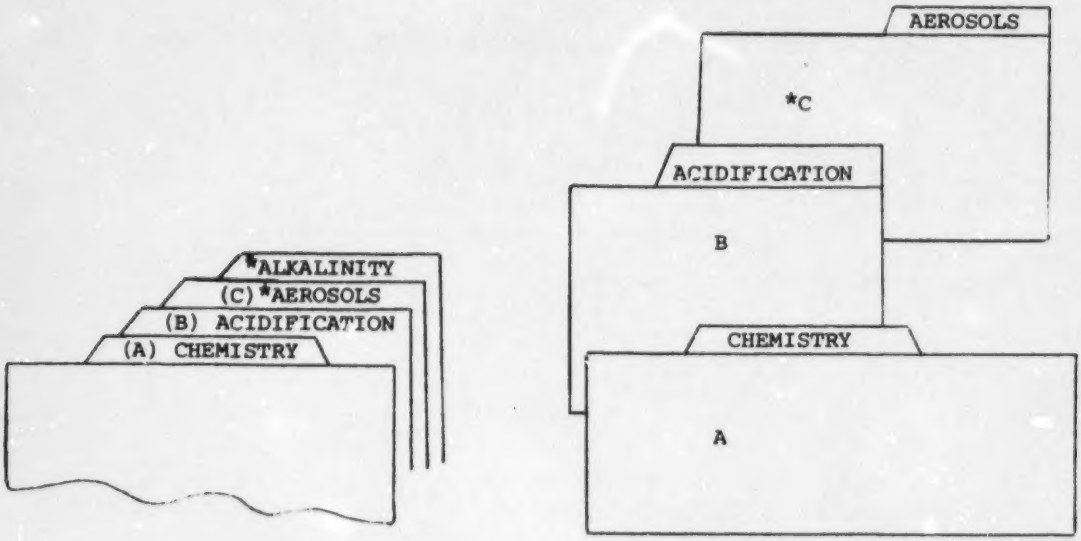


FIGURE 13

ARRANGEMENT OF HEAD CARDS



*Index cards of subjects falling within Acidification to be filed alphabetically behind the Sub-head card, (B).

15.8 In addition to the subject or content index on cards, an inventory could also be prepared in the following manner:

STI REGISTER

Subject - Chemistry Rep. - Report Pamp. - Pamphlet

Serial No.	STI Subject Content Vocabulary	STI Ref. in File	File Ref. Code given by the Creating Agency	Language
01	Acidification	S/Pamp./10-15/66	TI/5/10	Eng.
02	Alkalinity	S/REP/5-10/68	TI/7/25	do

15.9 In the planning of a STI retrieval system on the basis of content indexing, it is essential that a controlled, standard, science and technology vocabulary or

thesauri should be used. Otherwise content indexing must be left entirely to the indexer's discretion, and the users of STI may be misled when requesting files containing STI using the Context Indes. For example science and technology vocabularies, see Appendix 1.

16. ACCESS TO STI RECORDS IN ARCHIVES.

16.1 Access to records preserved in the National Archival agency is governed by the rules and regulations stipulated either by the record-creating agency or by the national legislative body of the country.

16.2 In many countries, non-current records transferred to the National Archives for permanent preservation are open for research thirty years after the date of their creation. Accordingly, records in archives containing STI should also fall within the thirty year rule, unless a longer restricted period is stipulated by the creating agency at the time of their transfer to the National Archives. Restrictions to intellectual access to archives may be for national security, sensitivity, privacy or commercial reasons.

16.3 In this study it has been proposed that access to STI should be clearly indicated in the transfer schedule. Any downgrading or declassification of STI records should be communicated immediately by the records creating authority to the National Archives. This is specially important in respect to STI which is essential for the use of national resources for development.

16.4 Liberalization of access to STI in archives for local scientists and technologists should be the policy of the record creating agencies and the National Archives. To achieve this objective it is essential that the National Scientific Information Centre work in close collaboration with the STI-creating agencies and with the National Archives. This close co-operation would help to liberalize access to STI in archives which are sometimes restricted for as long as 100 years. Liberalization of access may well depend on the confidence placed in the record creating agency and in the integrity of the user.

16.5 If the National Scientific Information Centre could develop a system where a letter issued by the Centre is honoured by the record creating agency and the National Archives, access problems to classified STI records could be largely resolved. Experience has shown that many STI records are restricted due to the lack of understanding of the research and informational value of the records for national development by the record-creating agency.

16.6 Accordingly, although access rules stipulated by the creating agencies should be honoured by archivists, early downgrading and declassification of STI records with the co-operation of the relevant authorities could ease the complex problem of access. If the 30-year rule applied rigidly to STI records in Archives, the writing of the recent history of science and technology will be seriously hampered. For maximum flexibility, consideration should be given to providing for access to the Archives by regulation, rather than by specifying in the Law a uniform closed period of years for all records transferred to the National Archives.

16.7 Preventing timely access to scientific and technological archives for the local scientists, prevent not only the history of science but also the discoveries and inventions of science and technology from becoming known to the greatest disadvantage of both the creators of science and technology record and archives and the people.

APPENDIX 1

1.1 Engineering Vocabulary

abatement
ablation
abrasion
abrasion resistance
abrasives
absorbers (equipment)
absorbers (materials)
absorption
acceleration
accelerators
accuracy
acid resistance
acoustic properties
acoustics
activated carbon
activation
actuation
actuators
adapters
adding machines
additives
adhesion
adhesives
adjustment
absorbents
adsorption
aeration
aerators
aerial photography
aerobic processes
aerodymanics
aeronautical engineering
aeronautics
aerosols
afterburners
age
agents
aging
agitation
agitators
agricultural engineering
agriculture
agronomy
air
air conditioning
aircraft
air pollution
airports
algae
algol
algorithms
alloys
alternating current
altitude
ammeters
amplification
amplifiers
anaerobic processes
analog computers
analyzing
anatomy
anchors
angles (geometry)
animals
annealing
antibiotics
applied mechanics
agiedicts
architecture
artesian wells
asphalts
assembling
assets
astronautics
astronomy
atmosphere (terrestrial)
atomic properties
atomizers
atomizing
atoms
attenuation
attenuators
autoclaves
automation
automobiles
bacteria
bacteriology
baffles
bagging
bags
baking
ball mills
bands
barges
batometers
bars
baths
beams (radiation)
beams (structural)
bearings
belts
bending
beneficiation
biochemistry
biology
blasting
bleaching
blenders
blending
blood
blowers
blowing
boats
boilers
boiling
boiling points
bolts
bonding

Source: Holm, Bart. E. How to manage your information, New York, 1968, pp. 65-71.

1.2 Chemical Vocabulary

abrasion
abrasion resistance
abrasives
absorbents (materials)
absorption
absorptivity
accelerators
accelerometers
acetylation
acidification
acidity
activitation
activation energy
activators
acylation
addition (chemicals)
additives
adducts
absorbents
absorption
aerosols
aethetics
agglomeration
aging
agitation
agitators
air
air conditioners
alcoholysis
alkalinity
alkylation
amidation
amination
ammeters
ammonolysis
amplifiers
analyzers
analyzing
animals
anions
antibiotics
anticoagulants
anti-caking agents
anti-coaming agents
anti-static agents
antioxidants
arcs
aspirators
atmospheres
atoms
autoclaves
azeotropes
azetropy
bacteria
bags
baking
barricades
batches
baths
batteries
beakers
belts
benches
benefication
biological oxygen demand
birefringence
bleaching
blenders
blending
blowers
blowing
boilers
boiling
boiling points
bombs
bonding (joining)
bottles
bowls
branching
brightening
briquetting
bromination
brushing
bubble caps
bubblers
buildings
burners
burning
caking
calandras
calcination
calendering
calorimeters
calorimetry
cameras
capping
carbonylation
carboxylation
carburizing
carpets
catalysis
catalysts
cations
cells
centrifuges
centriguging
chain lengthing
chain length
chain transfer
chain transfer agents

Source: Holm, Bart. E. How to manage your information. New York, 1968, pp. 86-89.

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